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An Empirical Assessment of Service Quality and Customers Preference of Cellular Service Providers in Nepal

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***Abstract*—**Nowadays cellular mobile is a very necessary product for our daily communication. Customers mainly purchase this product for instant communication and various services provided by the companies. Consumers' insight is varied as per the communication quality, facilities, call service, customer care, price, and service provider's attributes. So the challenge for the cellular mobile service providers is to find out quality of service (QoS) of the cellular network and the critical factors that influence the customer's preference. The major objective of the study is to cautiously examine the factors that have been playing a vital role the consumers' preference in selecting the telecommunication service providers. The study comprises a combination of descriptive, exploratory and causal approaches. The research involved data collection through the cellular mobile users at market places and educational institutions by using questionnaire as primary data source and telecom operators' MIS report published regular basis & others as secondary data sources. This study is also based on a survey research design. Another study was based on some practical approach finding the Key Performance Indicator (KPIs) data of the cellular networks. The received KPIs data was compared with the standard benchmark value and then confirm the best cellular service provider.

Keywords*—Mobile communication, service quality, service providers, key performance indicator*

INTRODUCTION

Customer service is related to satisfaction and it leads to consumer preference and purchase. As competition has been escalating among the corporations, it is ardently necessary for them to lean about the consumers' perception about the communication quality, call services, facility, price, customer care, service provider's capabilities and other important factors that may have been playing a vital role in selecting the telecommunication service providers (Kim and Park, 2004; Hafeez, 2010).

Telecommunication provides a lot for the world. The commerce that telecommunications creates is a nice little chunk of the gross world product. It provides business, money and market stability in the world. Not only does it create these things as a product of itself, it benefits and enhances the whole world market by creating a tighter community and allowing for quicker reaction time and exchange of information. Its importance and ever-growing demand was clearly estimated form the fourth edition of the ITU's World Telecommunication Development Report (NTA, 2007). It showed the growing importance of electronic information for economic, educational and social advancement, highlighting how critical universal access to communications has become. More than 40 million people are waiting for a telephone line worldwide. On the other hand least developed countries have telecommunication penetration levels up to 200 times lower that of developed countries.

Wireless communication has changed the working environment and individual mobility. Wireless communication is generally facilitated with wireless data cards or by connecting to the Internet through private or public network-based Wi-Fi hotpots or Wide Area Networks (WANs) of large work centers and sprawling educational campuses (Danher, 1996). Still other professionals use PDAs, Machine Internet Devices, Smart-phones, etc. to connect wirelessly to the Internet through the network coverage area of telecommunication service providers.

Nepal, officially the Federal Democratic Republic of Nepal, is a landlocked sovereign state located in South Asia. It is located in the Himalayas and bordered to the north by the People's Republic of China, and to the south, east, and west by the Republic of India. With an area of 147,181 square kilometers (56,827 sq mi) and a population of approximately 30 million, Nepal is the world's 93rd largest country by land mass and the 41st most populous country. Kathmandu is the nation's capital and the country's largest metropolis.

There is less than one telephone per 19 people. Landline telephone services are not adequate nationwide but are concentrated in cities and district headquarters. Mobile telephony is in a reasonable state in most parts of the country with increased accessibility and affordability; there were around 175,000 Internet connections in 2005 (NTA, 2007). After the imposition of the "state of emergency", intermittent losses of service-signals were reported, but uninterrupted Internet connections have resumed after Nepal's second major people's revolution to overthrow the King's absolute power.

At present, the incumbent operator, Nepal Doorsanchar Company Limited (NDCL) the than Nepal Telecommunications Corporation (NTC) is operating local, domestic, long distance, international telephony, cellular mobile and internet service including ADSL in Nepal. Besides NDCL the regulatory authority, NTA has issued one Mobile license to Ncell Private Limited (NCell), two Basic to United Telecommunication Limited (UTL) & Nepal Satellite Telecommunications Private Limited (NSTPL) and 2 rural telecom service licenses to private telecommunications operators known as STM Telecom Sanchar Privet Limited (STM) and Smart Telecom Private Limited (STPL). Nepal is committed to improving telecommunications services and efficiency through competition and effective regulation of the telecommunication sectors.

Subscription of Voice Telephony Service

Table 1: *Available voice telephony service in Nepal.*

Services / Operators	Fixed		Mobile		Others		Total
	PSTN	WLL	GSM	CDMA	LMS	GMPCS	
NDCL	662,803	123,415	10,180,617	1,216,671	-	-	**12,183,506**
UTL	-	49,748	-	-	474,102	-	**523,850**
NCell	-	-	12,157,355	-	-	-	**12,157,355**
STM	2,832	-	-	-	155	-	**2,987**
NSTPL	-	2,984	-	-	2,83,468	-	**286,452**
STPL	598	-	-	-	1,294,300	-	**1,294,898**
Others	-	-	-	-	-	1,742	**1,742**
Total	**666,233**	**174,336**	**22,337,972**	**1,216,671**	**2,052,025**	**1,742**	**26,435,781**
	840,569		**23,554,643**		**2,053,767**		

Services	**Subscription (%)**
Fixed	**3.18**
Mobile	**88.90**
Others (LMS, GMPCS)	**7.75**
Total	**99.84**

Population of Nepal 26,494,504 (Source: cbs.gov.np)

Data/Internet Services

Table 2. *Data/Internet service.*

Services	Subscribers						Total
	NDCL	UTL	NCell	STPL	STM	ISPs	
Dialup (PSTN+ISDN)	4,614	-	-	-	-	5,840	**10,454**
Wireless Modem Optical Fibre Ethernet	-	-	-	-	-	46,152	**46,152**
Cable Modem	-	-	-	-	-	65,202	**65,202**
ADSL	132,762	-	-	-	-	-	**132,762**
GPRS, EDGE,WCDMA	5,842,955	-	4,302,194	88,432	-	-	**10,233,581**
CDMA 1X, EVDO	136,573	61,595	-	-	-	-	**198,168**
WiMAX	12,060	-	-	-	-	-	**12,060**
VSAT based Internet	-	-	-	-	13	-	**13**
Total	**6,128,964**	**61,595**	**4,302,194**	**88,432**	**13**	**117,194**	**10,698,392**
		Internet Penetration (%)					**40.37**

Public Call Centres (PCO)

Table 3: *Public call center.*

Services	Subscribers
Rural PCO's of STM	1,447
Rural PCO's of STPL	598
Total	**2,045**

Table 4: *Cellular mobile subscriber as on july, 2015 in Nepal.*

S.No.	Service Providers	No. of Subscribers
1.	Nepal Doorsanchar Company Ltd. (NDCL) Subscriber (GSM + CDMA: 8,56,966)	12,178,522
2.	United Telecom Limited (UTL)	-
3.	Ncell Pvt. Ltd. **(**NCell)	12,157,355
4.	STM Telecom Sanchar Pvt. Ltd (STM)	-
5.	Nepal Satellite Telecom Pvt. Ltd. **(**NSTPL)	283,468
6.	Smart Telecom Pvt. Ltd. **(**STPL)	800,000
	Total	**24,638,111**

The major objective of the study is to cautiously examine the factors (Communication Quality, Call Service, facility, Price, Customer Care, Complaints Resolution and others) that have been affecting the consumers' perception to select mobile telecommunication (cellular) service delivered to users by cellular service providers in Nepal.

LITERATURE REVIEW

The GSM/CDMA Mobile Network Architecture

GSM is, short for Global System for Mobile Communications, one of the leading digital cellular systems. GSM uses narrowband TDMA, which allows eight simultaneous calls on the same radio frequency. GSM was first introduced in 1991. As of the end of 1997, GSM service was available in more than 100 countries and has become the de facto standard in Europe and Asia.

CDMA is short for Code-Division Multiple Access, a digital cellular technology that uses spread-spectrum techniques. Unlike competing systems, such as GSM, that use TDMA, CDMA does not assign a specific frequency to each user. Instead, every channel uses the full available spectrum. Individual conversations are encoded with a pseudo-random digital sequence (TORI, 2010). CDMA consistently provides better capacity for voice and data communications than other commercial mobile technologies, allowing more subscribers to connect at any given time, and it is the common platform on which 3G technologies are built (COAJ, 2009; Seth, 2005). Qualcomm created communications chips for CDMA technology, it was privy to the classified information. Once the information became public, Qualcomm claimed patents on the technology and became the first to commercialize it (Ranweera, 2003).

GSM or CDMA Network Components

The mobile network is subdivided into two systems. Each system comprises a number of functional units or individual components. These two subsystems are:

- Network Switching System (NSS)
- Base Station System (BSS)
- Operations and Maintenances Centre (OMC)
- Mobile Station (MS)

In addition to these, as with all telecommunications networks, mobile networks are operated, maintained and managed from computerized centers.

The BSS performs all the radio-related functions and is comprised of the following functional units:

- Base Station Controller (BSC)
- Base Transceiver Station (BTS)

The Base Station Controller (BSC) manages all the radio-related functions of a mobile network. It is a high capacity switch that provides functions such as MS (mobile station) handover, radio channel assignment and the collection of cell configuration data. A number of BSCs may be controlled by one MSC.

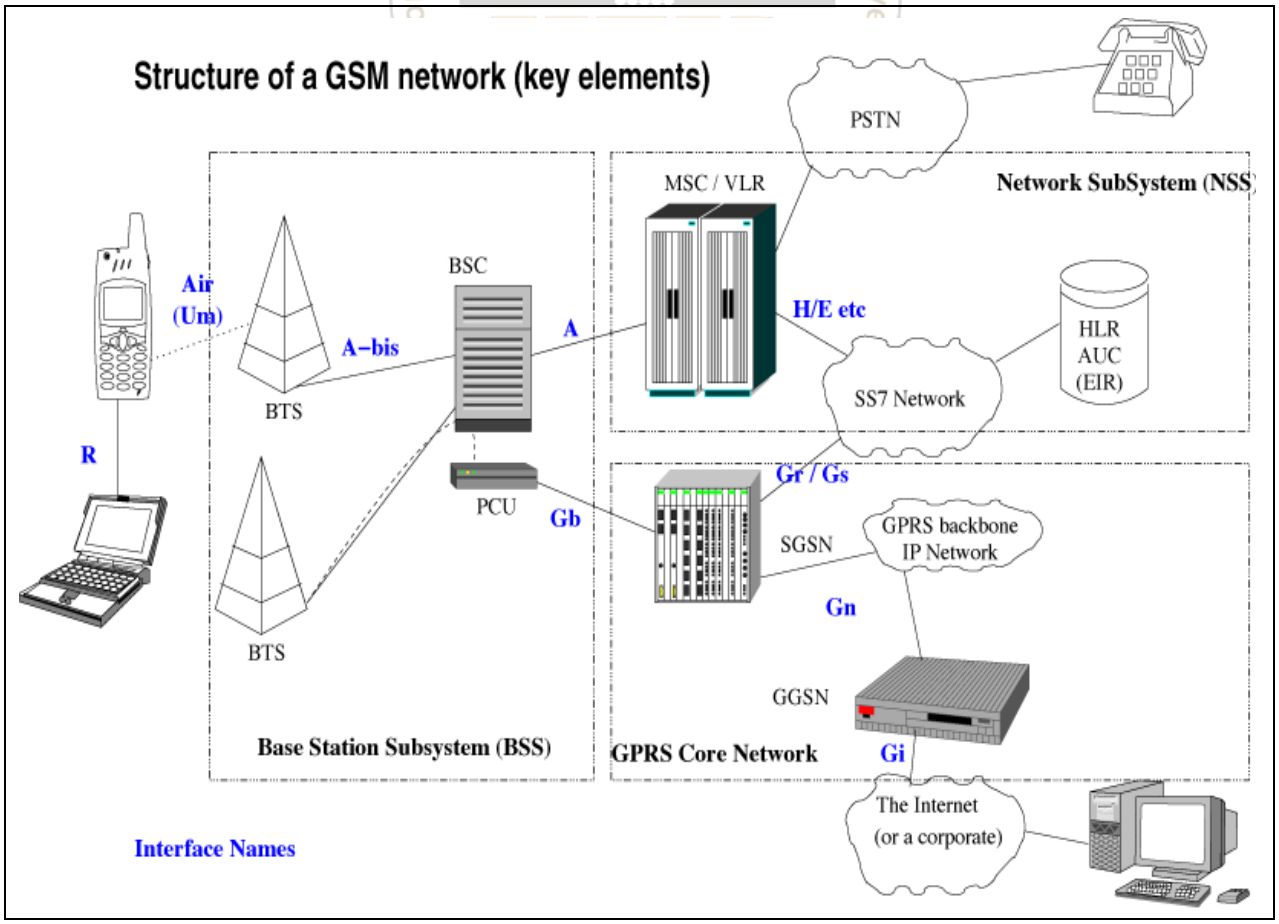

Fig. 1: *GSM network showing access and core network.*

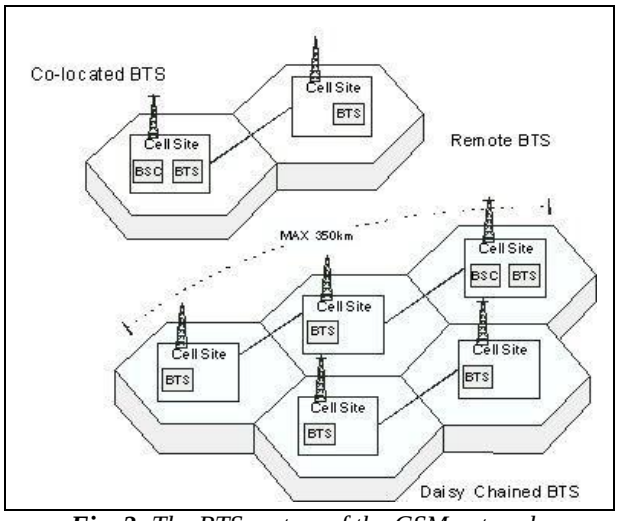

Fig. 2: *The BTS system of the GSM network.*

Path loss calculation

The general Path loss equation is given by (Okumara-Hata urban propagation model)

$$Lp = Q1 + Q2 \log (f) - 13.82 \log (Hbts) - a (hm) + \{44.9 - 6.55 \log (hbts)\} \log (d) + Qo \quad (1)$$

Lp = Path loss in dB
f = Frequency in MHz
d = Distance between BTS and the mobile (1-20 Kms)
Hbts = Base station height in meters (30 to 100m)
a (hm) = Correction required if mobile height is more than 1.5 meters and is given by:
a (hm) = {1.1 log (f) - 0.7} hm –{1.56 log (f) - 0.8} for urban areas and
=3.2{log (11.75hm)2-4.97for Dense urban areas
hm = mobile antenna height (1-10m)
Q1 = 69.55 for frequencies from 150 to 1000MHz
= 46.3 for frequencies from 1500 to 2000MHz
Q2 = 26.16 for 150 to1000 MHz
= 33.9 for 1500 to 2000 MHz
Qo = 0 dB for urban
= 3 dB for Dense urban

Capacity calculation:

The capacity of a given network is measured in terms of the subscribers or the traffic load that it can handle. The former requires knowledge of subscriber calling habits (average traffic per subscriber) while the latter is more general. The steps for calculating the network capacity are

- Find the maximum no of carriers per cell that can be reached for the different regions based on the frequency reuse patterns and the available spectrum.
- Calculate the capacity of the given cell using blocking probability and the number of carriers.
- Finally, the sum of all cell capacities gives the network capacity.

Spectrum efficiency = S / (N x A x B)(2)
S - total spectrum available
N - reuse factor
A - cell area
B - channel bandwidth

Erlang B table

To calculate the capacity of the given cell using blocking probability and the number of carriers we need the well-known Erlang B table or formulas and the no of traffic channels for different number of carriers. The result we get is the traffic capacity in Erlangs, which can easily be transferred into the number of subscribers.

Erlangs = n x t/3600 (3)

- n = no of calls attempted
- t = total duration in seconds

Key Performance Indicator (KPI) for Cellular Service Network along with benchmark values and period for averaging:

Table 5: *KPI for cellular service as per NTA.*

S.No.	Parameters	Bench Marks	Averaged over a period of
Network Performance:			
1	Service Access Delay	<15 sec	Sample of 1000 calls over a period of one quarter
2	Call Set-up Success Rate	>90%	One quarter
3	Call Drop Ratio	<3%	
4	Point of Interconnection(PoI) Congestion	<1%	
5	Response Time to the Customer fro Assistance		
	i) % of calls answered (electronically) (IVR):		
	within 30 sec	80%	One Quarter
	within 60 sec	95%	
	ii) % of calls answered by operator (voice to Voice):		
	Within 60 sec	80%	
	Within 90 sec	90%	
Customer Care:			
6	Promptness in attending *to* customers request (95% of request)		One Quarter
	• Service disconnection	By next day	
	• Additional facility		
Billing Complaints and Redressal:			
7	Billing Complaints per 1000 bills issued per month	<1	One Quarter
8	% of billing complaints cleared within a month.	>99%	One Quarter

S.No.	Parameters	Bench Marks	Averaged over a period of
Customer Perception regarding the services:			
9	% of customers satisfied with the network performance, reliability and availability.	>90%	
10	% of customers satisfied with the provision of service.	>90%	
11	% of customers satisfied with billing performance.	>85%	
12	% of customers satisfied with the help/ enquiry services.	>85%	
13	% of customers satisfied with the maintainability.	>90%	
14	% of customers satisfied with the offered supplementary	>90%	
15	Overall Customer Satisfaction	>90%	

RESEARCH DESIGN & METHOLOGY

Data Collection Procedures

Primary Database

A total of 125 questionnaires were distributed and 112 out of them have been completed, implying a response rate of 90 percent. Questionnaire includes five main construct i.e. image, price, quality, customer satisfaction and loyalty. Each construct had three to five questions with an itemized-licker ranking sacle of 1-5 (1=very poor, 2=poor, 3=average, 4=good, 5=excellent). All constructs are measured using multiple indicators. Customer satisfaction was assessed on six items viz. call service, communication, price, facility, customer care, and service provider. Call service was evaluated by two items – call forwarding and waiting and service quality. Communication dimension was assessed by call quality, call drop rate and geographical coverage area. Facility factor was covered by items short message service, technology use, and mobile entertainment. Price factor was represented by items call rate, promotional offers and product range. Customer care comprising of complaint redressal system and complain resolution. Service provider factor constitute with the items – customer relationship, innovativeness, restoration capability, reliability and responsiveness. The data collected from questionnaires were analyzed by reliability Analysis and factor analysis.

Secondary Database

For the study of this thesis, Secondary Data was also used and analyzed which is collected from the Management Information System (MIS) report prepared regular basis & others by the telecommunication service providers like – NT, NCell, NSTPL. All the existing service key indicator parameters (KPIs) mentioned in the MIS are taken for the study.

DATA PRESENTATION AND ANALYSIS

Drive Tests

The purpose of DT was for benchmark between Ncell and NTC GSM, WCDMA and LTE Coverage Verification. For this the DT route were selected to secure all sectors are being covered starting from site under verification the route was followed to other sites of the entire defined area route.

GSM-Voice Call Test

Rx Level Sub:

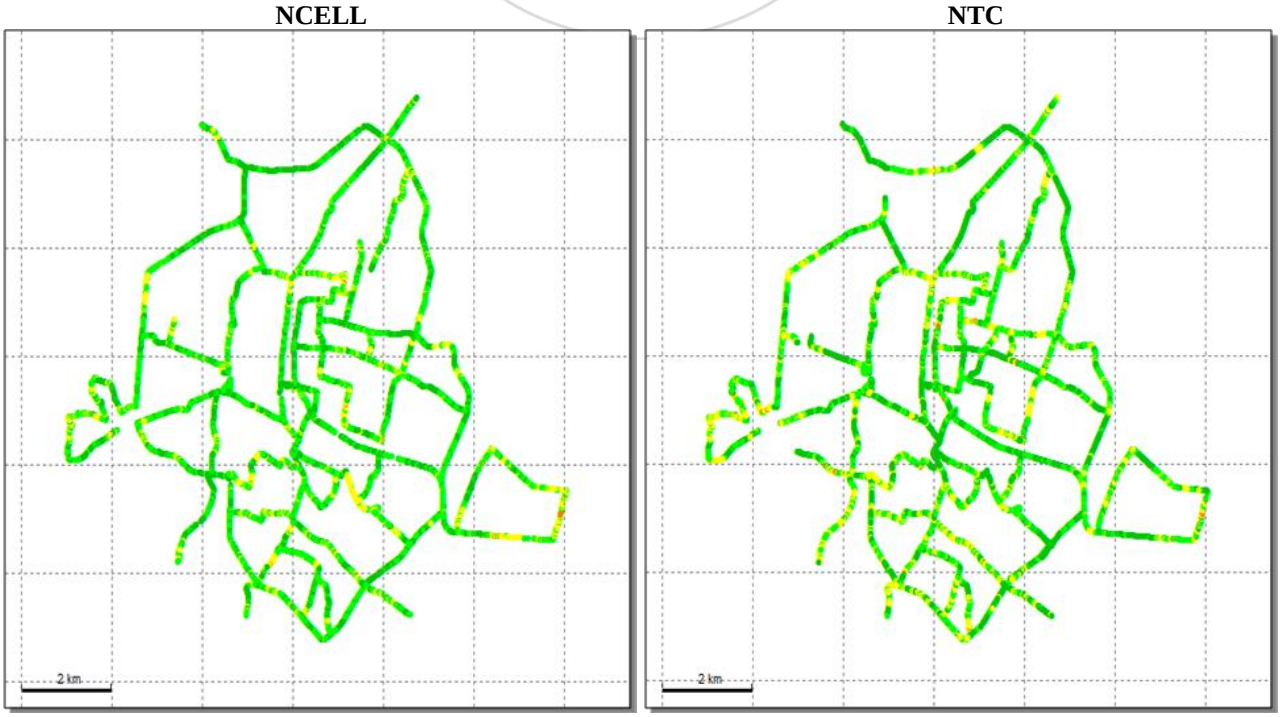

Fig. 3: *Ncell and NTC : RxLev Sub.*

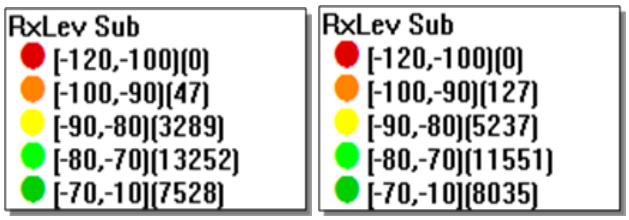

Fig. 4: *Ncell and NTC Legend : RxLev Sub.*

Table 6: *RxLev Sub.*

Name of Parameter	Thresholds	Ncell Percentage	NTC Percentage
Rx Level Sub (dedicated)	[-120,-100)	0	0
	[-100,-90)	0.19	0.51
	[-90,-80)	13.64	20.99
	[-80,-70)	54.95	46.3
	[-70,-10]	31.22	32.2

Rx Quality:

NCELL **NTC**

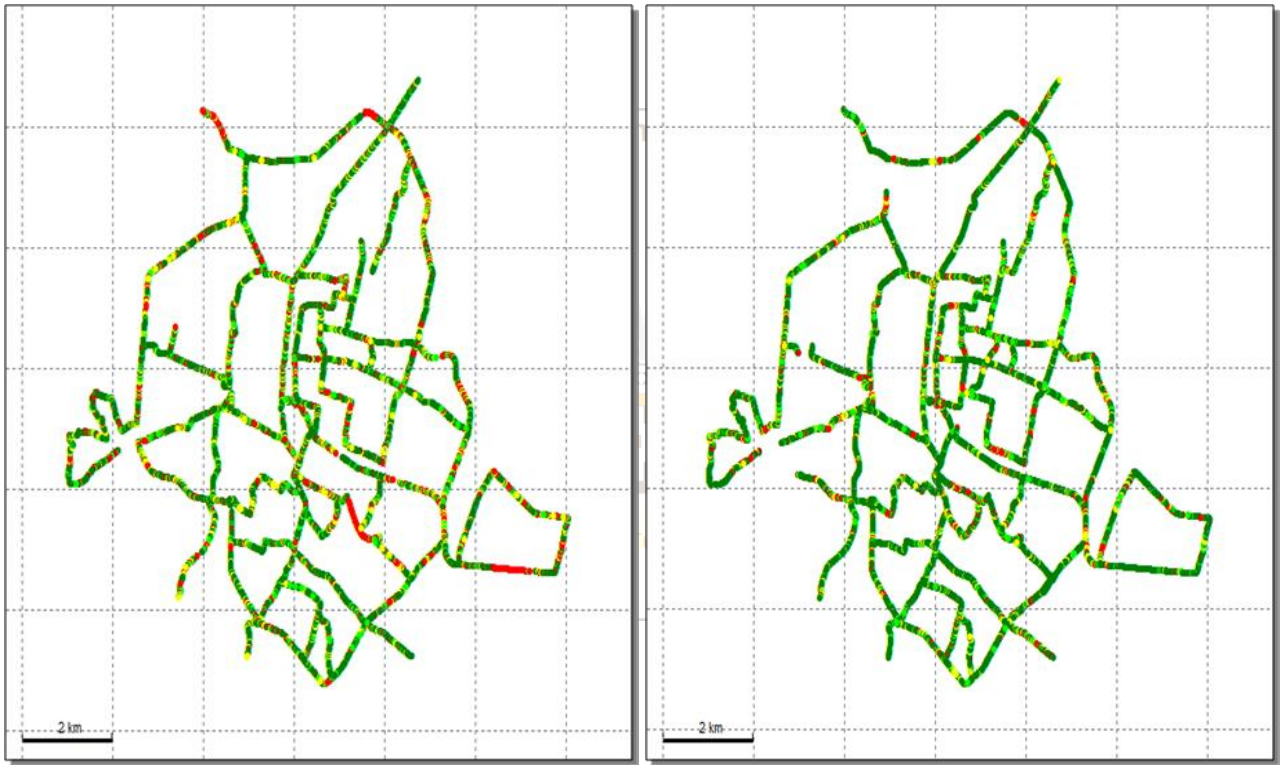

Fig. 5: *Ncell and NTC Map: RxQual Sub.*

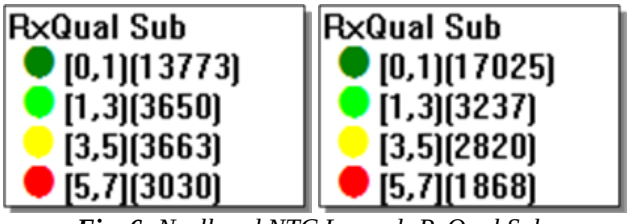

Fig. 6: *Ncell and NTC Legend: RxQual Sub.*

Table 7: *RxQual Sub.*

Name of Parameter	Thresholds	Ncell Percentage	NTC Percentage
Rx Quality Sub	[0,1)	57.11	68.24
	[1,3)	15.14	12.97
	[3,5)	15.19	11.3
	[5,7]	12.56	7.49

C/I Worst:

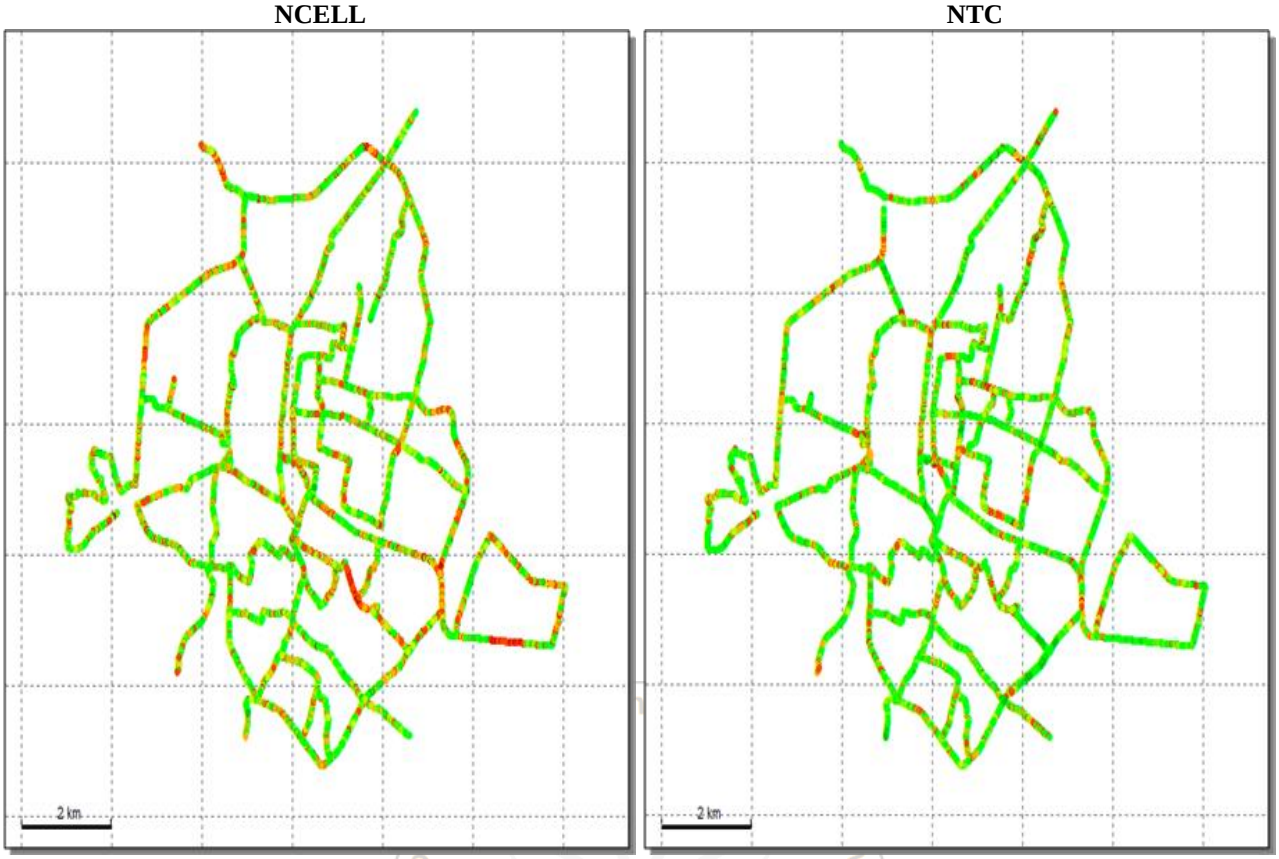

Fig 7: *Ncell and NTC Map: C/I Worst.*

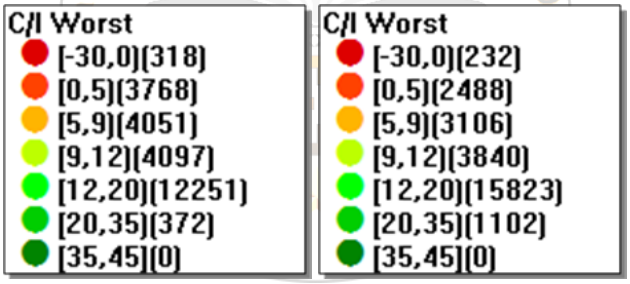

Fig. 8: *Ncell and NTC Legend:C/I Worst.*

Table 8: *Ncell and NTC Legend: C/I Worst.*

Name of Parameter	Thresholds	Ncell Percentage	NTC Percentage
C/I	[-30,0)	1.28	0.87
	[0,5)	15.16	9.36
	[5,9)	16.3	11.68
	[9,12)	16.48	14.44
	[12,20)	49.29	59.51
	[20,35)	1.5	4.14
	[35,45]	0	0

2G Drive Test KPI (Voice)

Table 9: *2G Drive Test KPI (Voice).*

Name	Value	
	Ncell	NTC
Outgoing Call Setup Success Rate(%)	100%	94.29%
Call Drop Rate(%)	1.82%	9.09%
HO Failure Rate(%)	1.53%	1.69%

WCDMA-HSDPA Test

3G RSCP for 1st Best in Active Set:

NCELL **NTC**

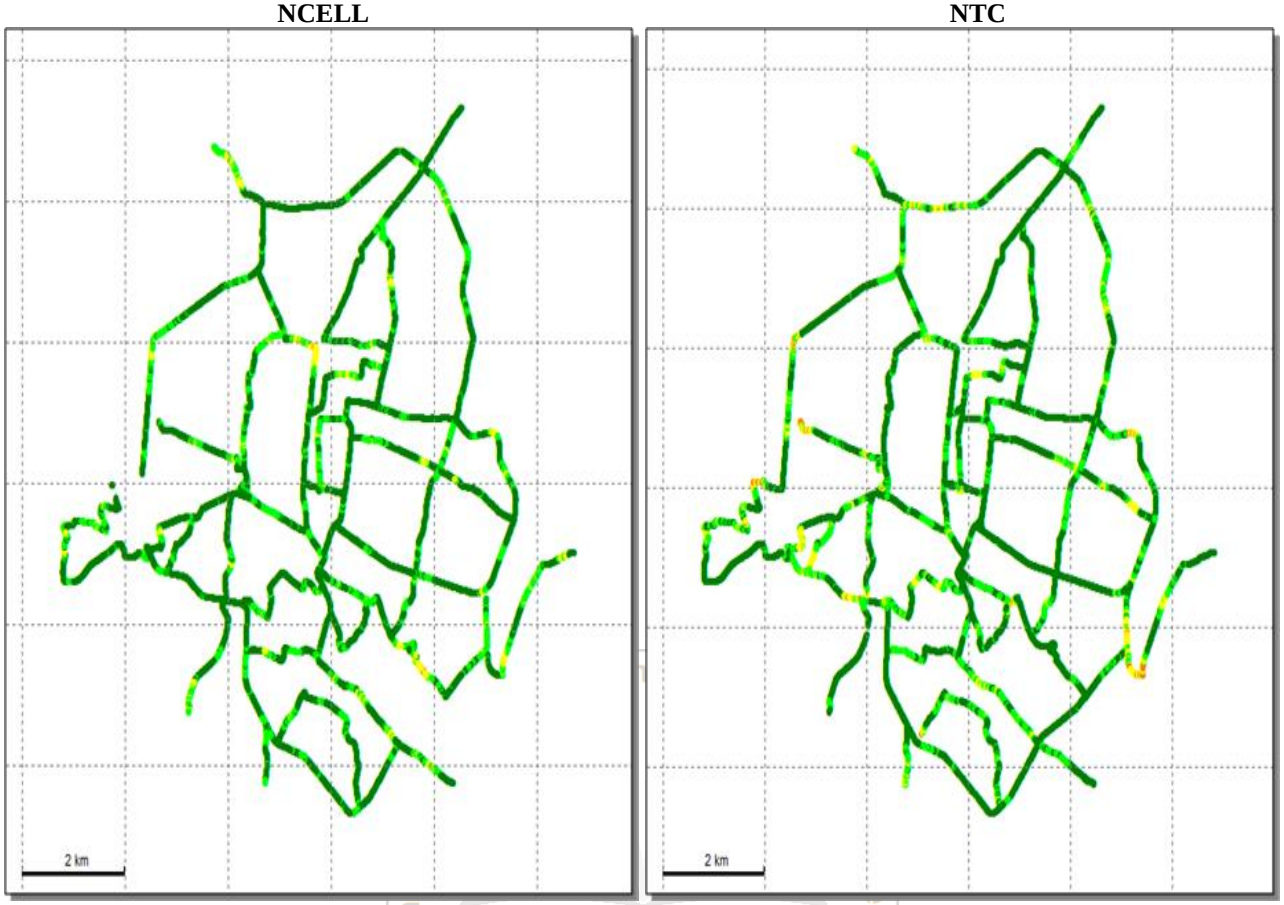

Fig. 9: *Ncell and NTC Map: RSCP For 1st Best in Active Set.*

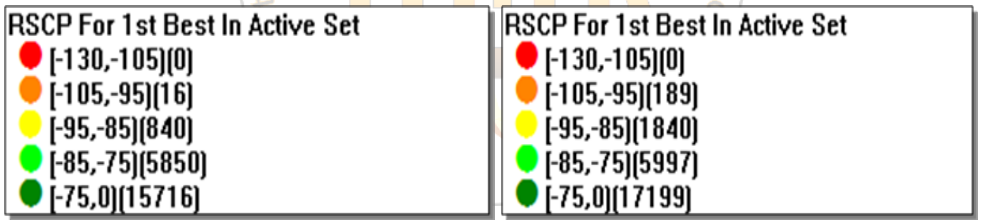

Fig. 10: *Ncell and NTC Legend: RSCP for 1st Best in Active Set.*

Table 10: *Ncell and NTC Table: RSCP for 1st Best in Active Set.*

Name of Parameter	Thresholds	Ncell Percentage	NTC Percentage
RSCP	[-130,-105)	0	0
	[-105,-95)	0.07	0.75
	[-95,-85)	3.75	7.29
	[-85,-75)	26.09	23.77
	[-75,0)	70.09	68.18

3G Ec/Io for 1st Best in Active Set:

Table 11: *Ncell and NTC Table: Ec/Io for 1st Best in Active Set.*

Name of Parameter	Thresholds	Ncell Percentage	NTC Percentage
Ec/Io	[-40,-16)	3.9	2.41
	[-16,-12)	36.29	17.28
	[-12,-6)	56.74	76.26
	[-6,0]	3.07	4.05

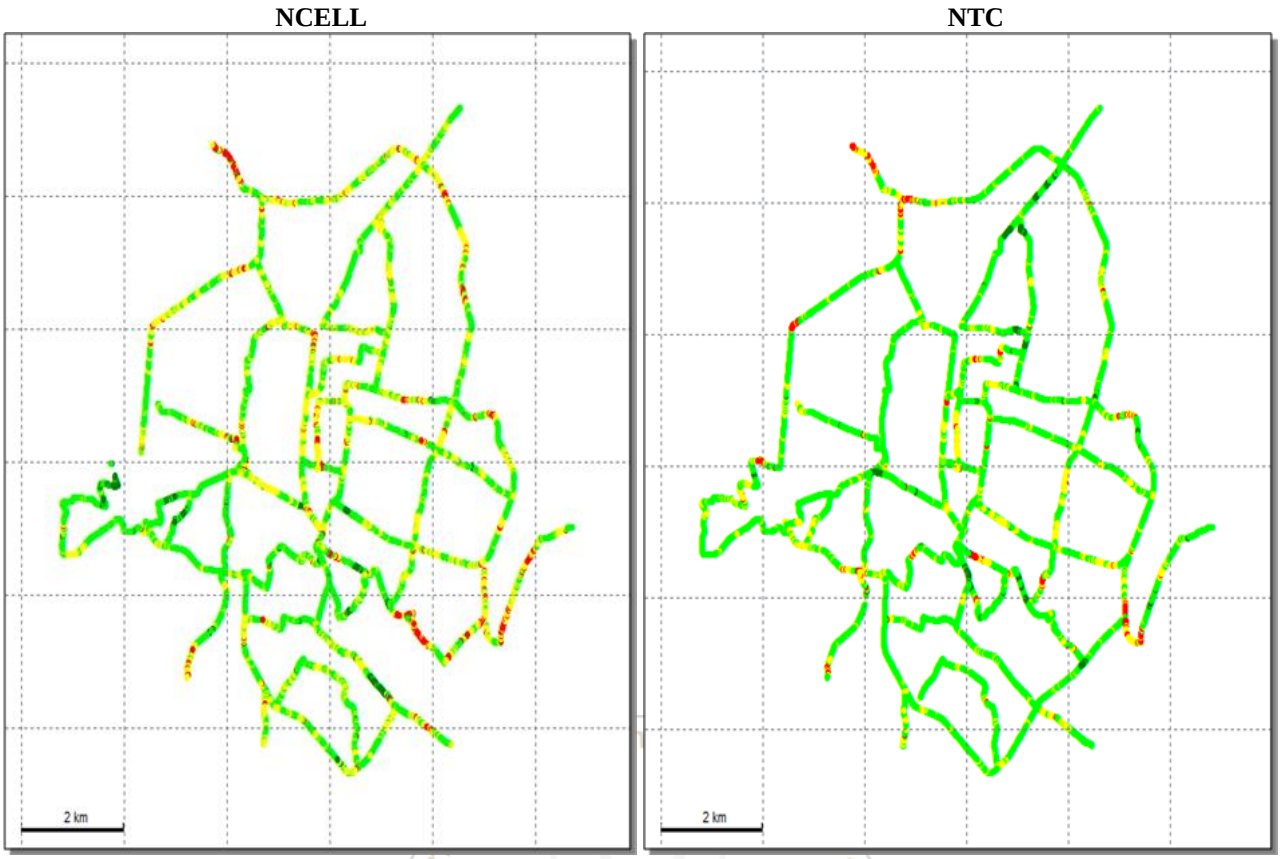

Fig. 11: *Ncell and NTC Map:Ec/Io for 1st Best in Active Set.*

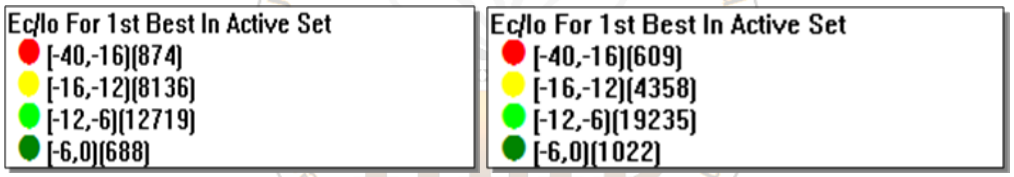

Fig. 12: *Ncell and NTC Legend:Ec/Io for 1st Best in Active Set.*

3G Drive Test KPI (HSDPA):

Table 12: *3G Drive Test KPI (HSDPA).*

Name	Ncell Value	NTC Value
PDP Activation Success Rate(On PDPReq)(%)	N/A	100.00%
Session Drop Rate(%)	N/A	N/A
R99 SHO Success Rate(%)	99.96%	99.97%
H to H Intra Freq Cell Change Success Rate(%)	100.00%	100.00%
Intra Freq EDCH Serving Cell Change SHO Success Rate(%)	100.00%	100.00%
Session Setup Time Avg(ms)	N/A	N/A
UE Pilot Pollution Rate(%)	9.28%	5.15%

3G HSDPA Throughput Comparison of Ncell and NTC:

Table 13: *3G HSDPA Throughput Comparison of Ncell and NTC.*

Element	RLC PDU Throughput DL_MS1_NCELL_HSDPA	RLC PDU Throughput HSDPA_NTC
Average	6100.32	2837.61
CDF 5%	10466.41	4859.15
Maximum	28320.89	13746.43
Minimum	0	0
Standard Deviation	4882.26	2415.77
[0,56)	406(5.52%)	390(4.91%)

Element	RLC PDU Throughput DL_MS1_NCELL_HSDPA	RLC PDU Throughput HSDPA_NTC
[56,128)	100(1.36%)	141(1.78%)
[128,256)	118(1.60%)	209(2.63%)
[256,512)	349(4.75%)	863(10.87%)
[512,1024)	285(3.87%)	614(7.74%)
[1024,2048)	599(8.14%)	1370(17.26%)
[2048,14336)	4978(67.68%)	4350(54.81%)
[14336,58000]	520(7.07%)	0(0.00%)
Sum Total	7355	7937

LTE-DL Test: LTE Serving RSRP

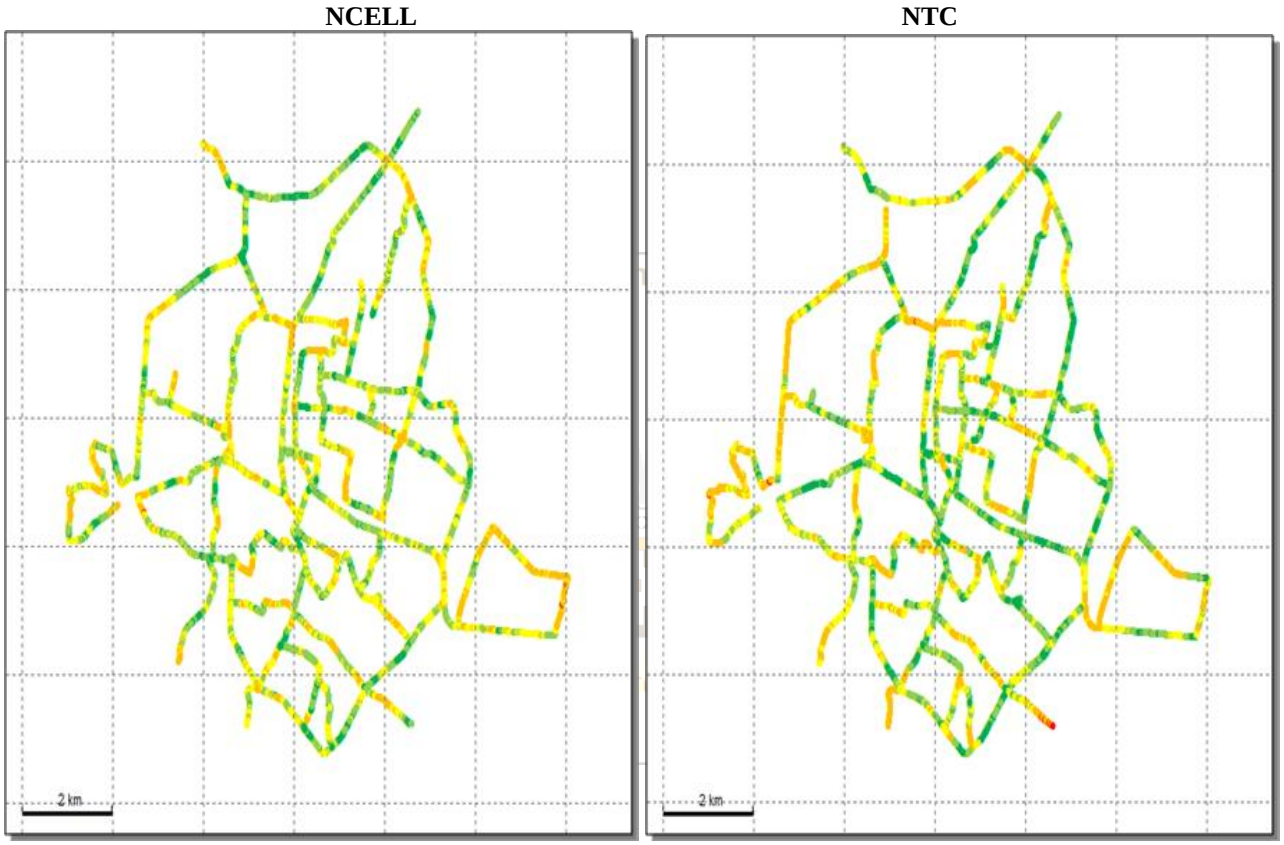

Fig. 13: *Map: Serving RSRP.*

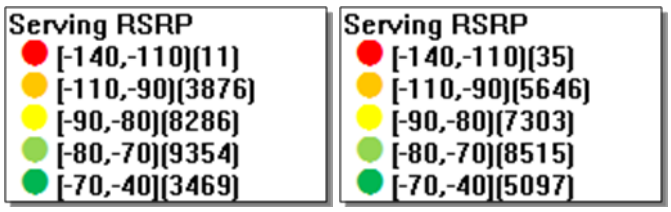

Fig. 14: *Legend: Serving RSRP.*

Table 14: *Serving RSRP.*

Name of Parameter	Thresholds	Ncell Percentage	NTC Percentage
RSRP	[-140,-110)	0.04	0.13
	[-110,-90)	15.51	21.23
	[-90,-80)	33.15	27.46
	[-80,-70)	37.42	32.02
	[-70,-40]	13.88	19.16

LTE Serving RSRQ

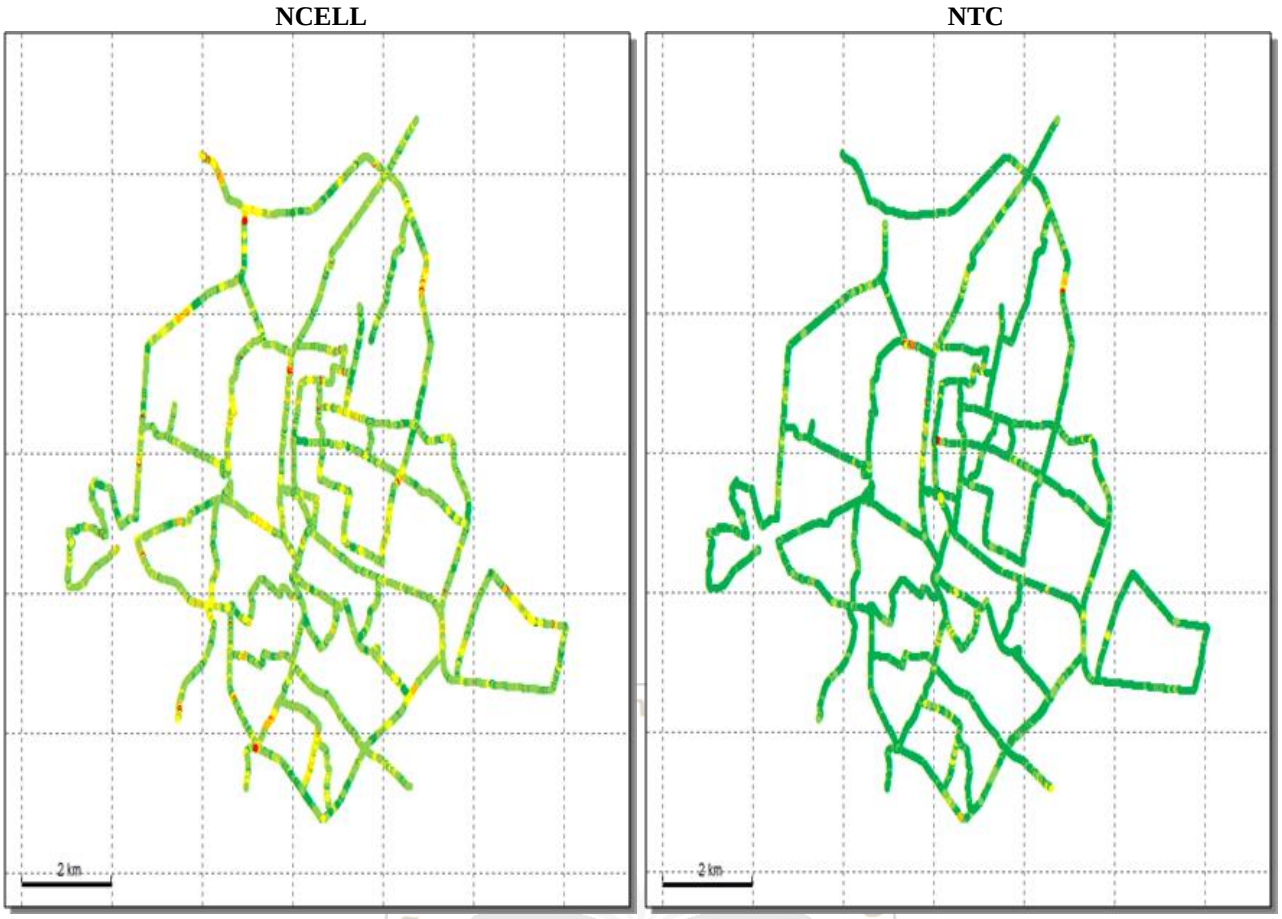

Fig. 15: *Serving RSRQ Comparison.*

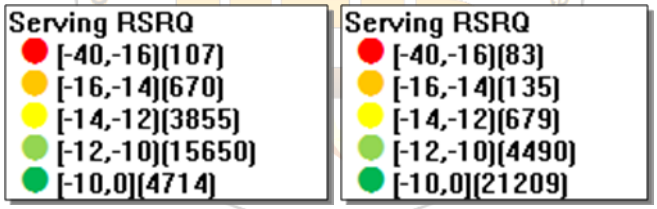

Fig. 16. *Legend:Serving RSRQ Comparison.*

Table 15: *Serving RSRQ Comparison.*

Name of Parameter	Thresholds	Ncell Percentage	NTC Percentage
RSRQ	[-40,-16)	0.43	0.31
	[-16,-14)	2.68	0.51
	[-14,-12)	15.42	2.55
	[-12,-10)	62.61	16.88
	[-10,0]	18.86	79.75

LTE Serving SINR

Table 16: *PCC SINR Comparison.*

Name of Parameter	Thresholds	Ncell Percentage	NTC Percentage
PCC SINR	[-20,0)	5.32	3.86
	[0,6)	15.62	15.98
	[6,12)	26.54	27.36
	[12,18)	28.26	24.53
	[18,50]	24.26	28.28

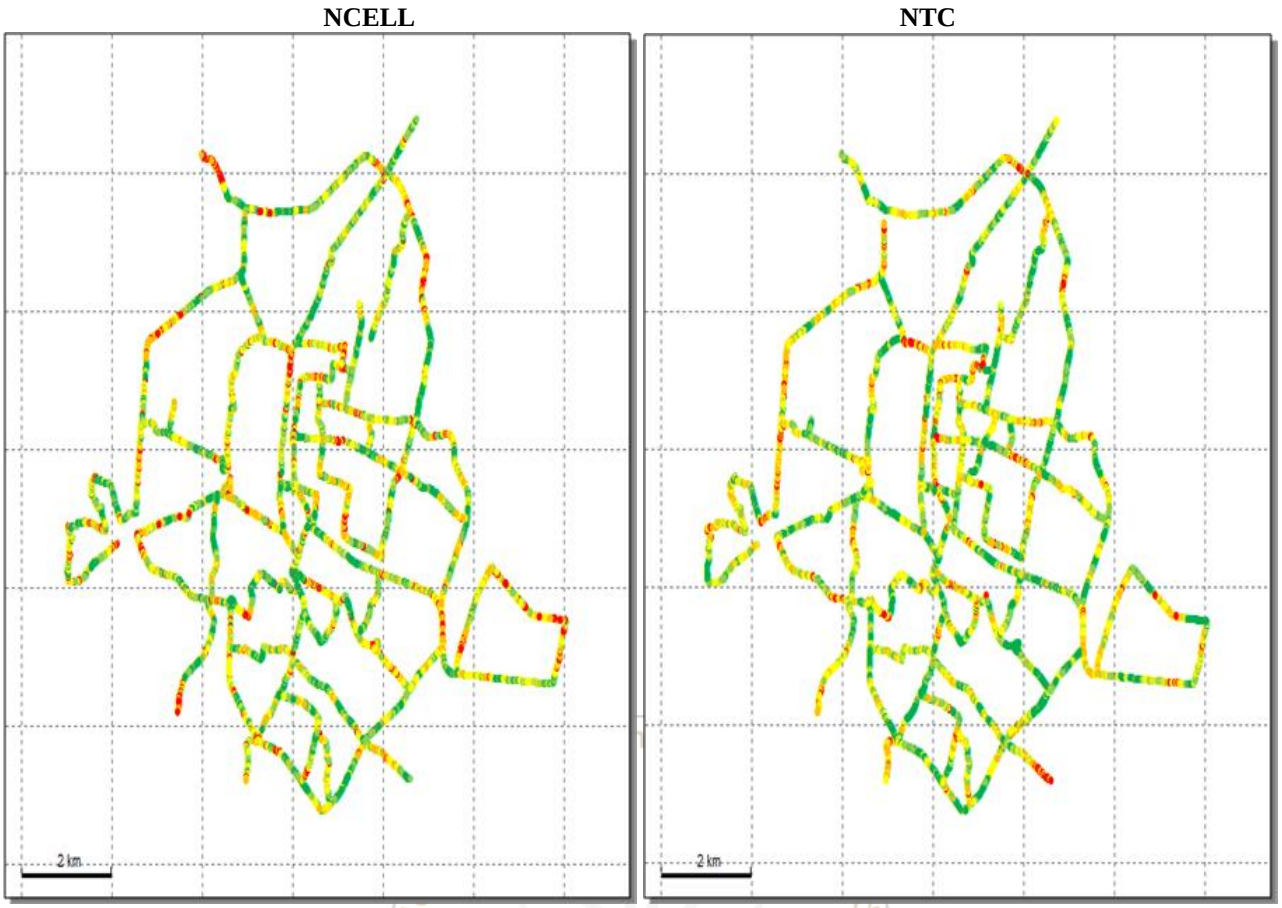

Fig. 17: *PCC SINR Comparison.*

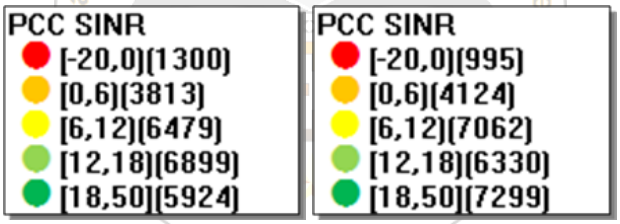

Fig. 18: *Legend:PCC SINR Comparison.*

Table 17: *LTE Drive Test KPI (PDCP Throughput DL).*

Name	Ncell Value	NTC Value
LTE RRC Setup Success Rate(%)	100.00%	100.00%
Intra Frequency HO Attempt Success Rate(%)	93.99%	82.94%
Intra Freq HO Success Rate(%)	100.00%	1
Inter Freq HO Success Rate(%)	N/A	N/A
ERAB Setup Success Rate(%)	100.00%	100.00%
RRC Setup Success Counter	8	10
RRC Setup Failure Counter	0	0
ERAB Setup Success Counter	6	9
ERAB Setup Failure Counter	0	0
ERAB Normal Rel Counter	0	0
ERAB Abnormal Rel Counter	1	2
Intra Frequency HO Time Delay Avg(ms)	15.40ms	15.80ms
Inter Frequency HO Time Delay Avg(ms)	N/A	N/A

Table 18: *LTE PDCP Throughput DL of NCELL and NTC.*

Element	PDCP Throughput DL_NCELL	PDCP Throughput DL_NTC
Average	10169.01	9054.15
CDF 5%	10724	5118
Maximum	842184	6460773
Minimum	0	0
Standard Deviation	7686.19	41932.67
[0,500)	98(0.40%)	284(1.18%)
[500,1000)	114(0.47%)	101(0.42%)
[1000,5000)	4399(18.10%)	7074(29.30%)
[5000,10000)	8538(35.13%)	8494(35.18%)
[10000,307200]	11154(45.90%)	8189(33.92%)
Sum Total	24303	24142

Table 19: *Summary.*

Elements	Ncell Average Values	NTC Average Values
RxLev Sub (dBm)	-73.2	-73.23
RxQual Sub (dB)	1.44	0.99
C/I Worst	11.34	13.11
RSCP (dBm)	-70.02	-70.12
Ec/Io (dB)	-11.57	-10.52
HSDPA (Mbps)	5.957	2.771
RSRP (dBm)	-79.86	-80.22
RSRQ (dB)	-10.85	-9.15
SINR	12.28	12.99
PDCP Throughput (Mbps)	9.930674	8.841943

Table 20: *Users of cellular service: used their favorite service provider wise.*

Cellular Service Provider in Nepal	No. of respondent	Percentage (%)
NDCL	63	56.25
NCell	33	29.46
NSTPL	10	8.92
Others	6	5.35
Total	112	100

Table 21: *Average grade level of important factors of the service provider.*

Factor	Average Grade			
	NTC	NCell	NSTPL	Others
Communication	4.7	4.48	4.6	4.83
Call Service	4.4	4.36	4.5	4.5
Facility	4.23	4.27	4.4	4.67
Price	4.6	4.48	4.6	4.83
Customer Care	4.5	4.48	4.3	4.33
Complaints Resolution	4.38	4.3	4.3	4.33

This shows the current available KPI values of the existing networks of the service providers: NTC and NCell. Based on these data we may easily compare with the standard KPIs value and confirm the Service Quality of the cellular network and customer preferences' to select the cellular service provider. This approach method is technically reliable and acceptable.

The collection of KPIs here proposed constitutes a useful tool for TETRA carriers and planning engineers who require improving the performance of their networks.

Based on the available KPIs data as per secondary data, we may decide the existing cellular service network has been met the standard benchmark values or not.

As presented in table 20, the sample included user of cellular service: 56% of NDCL, 30% Ncell, 9% NSTPL and 5% others in Nepal.

The above data clearly indicates that communication and price is most influential and most preferential factors in selecting telecommunication service provider. Hence, this approach method is also technically acceptable and reliable for the same.

Major Findings of the study

As a result of above analysis of data some major findings may be summed up as listed below:

- Our first major finding is the most important or critical factors like communication, call service, facility, price, customer care and complaints resolution that may have been playing a vital role the customers' preference in selecting the telecommunication service providers.
- Second major finding includes the study shows communication and price factor is most influential and most preferential factors in selecting telecommunication service provider. Customer Care and Complaints resolution factors are second priority and facility factor is the third.
- The third major finding also introduces a set of KPIs which is considered necessary and sufficient in order to allow cellular service providers or operators to be aware of whether provided services meet the QoS requirements established by end users.
- The next major finding is the collection of KPIs here proposed constitutes a useful tool for TETRA carriers and planning engineers who require improving the performance of their networks.
- The outcome of this research shows a comprehensively integrated framework to understand the relationships among several dimensions.

Limitations

There will be some limitations while undergoing this study. The main limitations of the study will be:

- This study is based on the analysis of existing Cellular Services of Nepal.
- This study is based on the context of Nepal and it will not applicable for other countries.
- This study is only applicable for telecommunication sector and not applicable for any other sectors even in Nepal.
- Convenience sample was used to measure cellular mobile phone users' perception of service quality.

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary

Companies should deliver superior service quality to customers so that they could survive for a longer period of time in the market. Customer always desire for better quality services. The companies focus is on economic efficiency, as it is generally observed that profit and/or cost reduction are key ingredients to survival and growth. Service is a form of attitude which is related to satisfaction and also leads to consumer preference and future purchase. In general consumers prefer better service quality and price. Service quality helps to create the competitive advantage among other providers. Price plays a vital role in telecommunication market especially to mobile telecommunication service providers. It includes not only the purchase price but also the call charges. Generally, a price-dominated mass market leads to customers having more choices and opportunities to compare the pricing structures of diverse service providers. A company that offers lower charges would be able to attract more customers committing themselves to the better telephone networks, and significant number of "call minutes" might be achieved. Consumer's perception of product quality is always an important aspect of a purchasing decision and market behavior.

Conclusion

The following conclusions have been drawn from the results of this study:

- Consumers regularly face the task of estimating product quality under conditions of imperfect knowledge about the underlying attributes of the various product offers with the aid of personal, self-perceived quality criteria.
- The major objective of this study is to cautiously (carefully) examine the factors that have been affecting the consumers' perception to select mobile telecommunication service.
- Based on the available KPIs data, we may decide the existing cellular service network has been met the standard benchmark values or not.
- It helps to provide the necessary suggestions to cellular mobile service providers to maintain the network performance and the QoS levels delivered to the users.
- It helps to promote the availability of Quality Cellular Services at just, reasonable and affordable rates with optimum satisfaction of the customers.
- It helps to provide necessary ideas/guidelines to the customers for selecting the best cellular mobile service provider.
- It helps the consumers regularly face the task of estimating product quality under conditions of imperfect knowledge about the underlying attributes of the various product offers with the aid of personal, self-perceived quality criteria.
- The improvement in efficiency and utilization of telecom network of cellular service providers due to maintain the network performance and the QoS levels delivered to the users.
- Quality Service of Cellular Mobile links to socio-economic development of the country.
- The outcome of this research shows a comprehensively integrated framework to understand the relationships among several dimensions.

Recommendations

Based on the conclusions derived from this study, the following recommendations have been suggested to the policy makers and telecom operators or service provider as a way of encouraging the improvement of QoS of Network Perfomance and others critical factor that influence the customers' preference the selecting of cellular service provider trend in Nepal.

REFERENCES

[1] COAI. (2009). Cellular Operators Association of India's report 2009. *Cellular Operators Association of India*. http://www.coai.com/statistics.php (accessed June 19, 2011)

[2] DANAHER, P.J, Rust, R.T. (1996). Indirect Financial Benefits from Service Quality. *Quality Management Journal*,3(2), 63-75.

[3] HAFEEZ, S., Hasnu, S. (2010). Customer Satisfaction for Cellular Phones in Pakistan: A Case Study of Mobilink. *Business and Economics Research Journal*, 1(3), 35-44.

[4] KIM, M., Park, M., Jeong, D. (2004). The Effects of Customer Satisfaction and Switching Barrier on Customer Loyalty in Korean Mobile Telecommunication Services. *Telecommunications Policy*, 28,145-159.

[5] RANAWEERA, C., Neely, A. (2003). Some Moderating Effects on the Service Quality-customer Retention Link. *International Journal of Operations & Production Management,*23(2), 230-248.

[6] SETH, A., Momaya, K., Gupta, H. (2005). E-Service Delivery in Cellular Mobile Communication: Some Challenges and Issues. *Global Journal of e-Business and Knowledge Management*, 2(2), 30-42.

[7] TROI. (2010). The Indian Telecom Services Performance Indicators April - June 2010. *Telecom Regulatory Authority of India*, New Delhi, India.

[8] NTA. (2007). The Quality of Service Parameters for Cellular Service – Approved by NTA on 12 Asadh, 2064 B.S. (26 June, 2007). Nepal Telecommunication Authority, Kathmandu, Nepal.

